

REVIEW OF *DACTYLOSTERNUM* WOLLASTON SPECIES OF AUSTRALIA AND NEW ZEALAND (COLEOPTERA: HYDROPHILIDAE)

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Abstract

Three species of the large terrestrial hydrophilid genus *Dactylosternum* Wollaston are reported from Australia and New Zealand, keys are provided to distinguish the species and separate the genus from allied sympatric genera, and distribution maps are given for each species in the Australian region. *D. abdominale* (Fabricius), a nearly cosmopolitan species that had not been confirmed from Australia previously, has probably been introduced into Australia and New Zealand in this century and is now widespread in synanthropic habitats. The Indo-Malayan species *D. dytiscoides* (Fabricius) may be indigenous to northern Queensland. *D. marginale* (Sharp), the only species restricted to the Australian region, was first described over a century ago from Auckland, New Zealand, but evidence presented here suggests that it is actually endemic to eastern Australia; it has probably been introduced into New Zealand and perhaps Norfolk Island in historical times.

Introduction

In the southern temperate regions, as also in most of the tropics, little recent work has been done on the Staphyliniformia and the fauna is very poorly known. Among the least studied members of this group is the primarily terrestrial hydrophilid subfamily Sphaeridiinae. In Australia, for example, only seven genera have been recorded, but at least 16 genera (several of them still unnamed) are represented in collections, and the discrepancy at the species level is even greater.

This note summarizes new information for the Australian and New Zealand species of one of the named genera, *Dactylosternum* Wollaston. This genus is not treated in recent regional reviews of Australian Coleoptera (Matthews 1982, Moore 1984). The study was prompted by a request from G. Kuschel for identification of an odd specimen of *Dactylosternum* from New Zealand.

Materials

Specimens used in this study were examined by loan or during visits to the following institutions (referred to hereafter by the indicated abbreviations):

Australian National Insect Collection, CSIRO, Canberra (ANIC); Bernice P. Bishop Museum, Honolulu (BPBM); Field Museum of Natural History, Chicago (FMNH); Museum of Comparative Zoology, Cambridge MA, USA (MCZ); Museum of Victoria, Abbotsford (MV); National Museum of Natural History, Washington DC, USA (USNM); New Zealand Arthropod Collection, DSIR, Auckland (NZAC); South Australian Museum, Adelaide (SAM)

Tribe Sphaeridiini

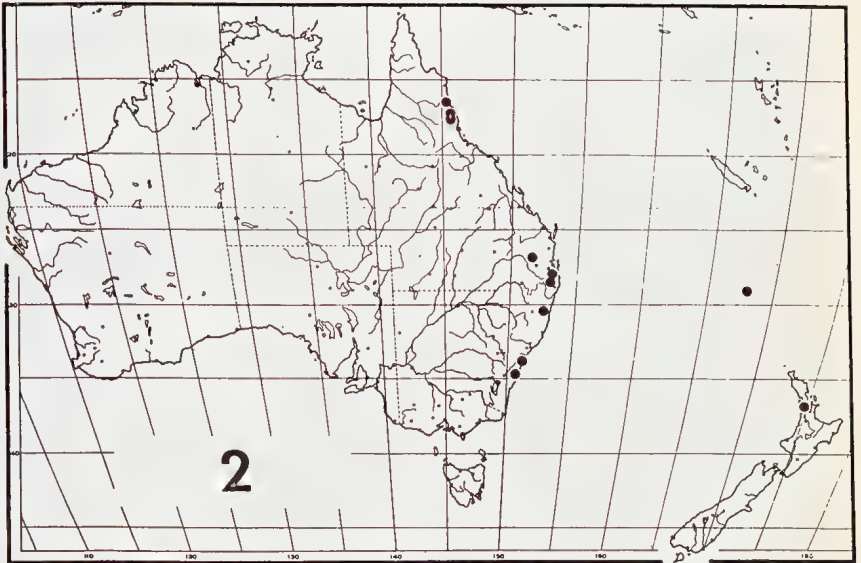
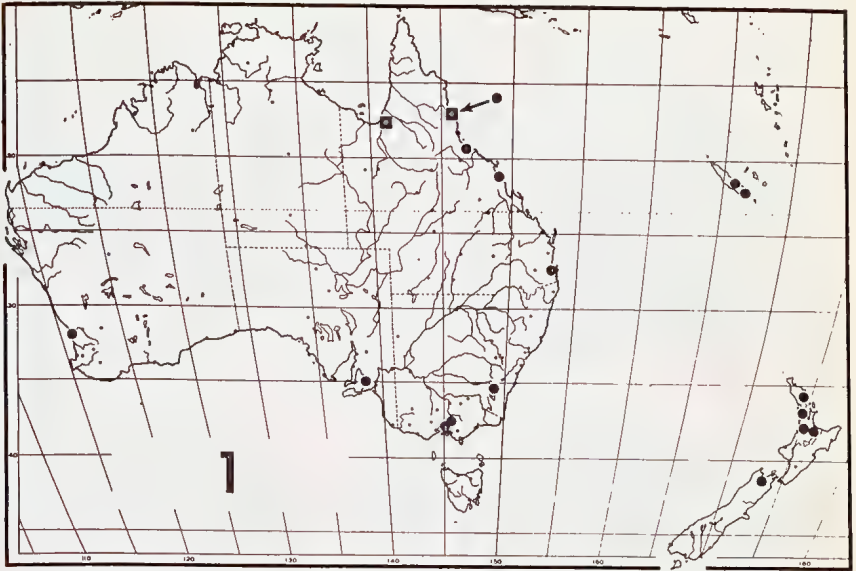
In a worldwide (but still unpublished) generic revision and phylogenetic analysis of Sphaeridiinae, Malcolm (1981) includes *Dactylosternum* as one of 17 genera of the tribe Sphaeridiini and provides a key to these genera and a description of each genus. Smetana (1978) also provides a recent and well-illustrated account of the North American species of the subfamily, including three species of *Dactylosternum*. The genera of Sphaeridiini may be distinguished from other hydrophilids by the combination of: base of antenna hidden from above by expanded antero-lateral margin of head, which extends nearly to outer edge of eye (Fig. 3); and basal segment of hind tarsus at least as long as second segment (Fig. 6). Four genera of Sphaeridiini (*Dactylosternum*, *Sphaeridium* Fabricius, *Coelostoma* Brullé and an undescribed genus) occur in Australia, and the first two of these also occur in New Zealand. These genera may be distinguished by the following key.

Key to genera of Sphaeridiini of Australia and New Zealand

- 1. Elytron with 10 punctate striae or rows of punctures, at least on basal 2/3 2
 Elytron at most with partial stria along suture, otherwise evenly finely punctate 3
- 2. Mesocoxae distinctly separated by raised pentagonal mesosternal intercoxal process (Fig. 5)..... *Dactylosternum* Wollaston
 Mesosternum carinate posteriorly, mesocoxae subcontiguous (undescribed genus and species)
- 3. Scutellum less than twice as long as its basal width; mesocoxae distinctly separated by raised pentagonal mesosternal intercoxal process (Fig. 5) *Coelostoma* Brullé
 Scutellum more than twice as long as its basal width; mesosternum with rounded elevation posteriorly, mesocoxae less separated *Sphaeridium* Fabricius

Genus *Dactylosternum* Wollaston

Dactylosternum includes about 65 species worldwide, most of them tropical in distribution. The species commonly inhabit decaying organic matter of various kinds, including rotting fruit and cacti, decaying logs, and similar substances, especially in the fermentation stage of decay (Smetana 1978). No comprehensive revision or key to species has been published, and immature stages and details of the biology are not known for any members of the genus.



Figs 1-2. Known distribution in Australian region of *Dactylosternum* spp.: (1) *D. abdominale* (●) and *D. dytiscoides* (■); (2) *D. marginale* (●).

Key to *Dactylosternum* species of Australia and New Zealand

1. Body red except for elytra, which are dark brown to black; size larger, at least 5 mm long; elytron with rows of large punctures but without impressed striae *dytiscoides* (Fabricius)
 Body dark brown to black; size smaller, less than 5 mm long; elytron with impressed and punctate striae 2
2. Prosternum with small acuminate apical projection; basal segment of metatarsus longer than segments 2-3 combined; aedeagus with parameres greatly expanded apically (Smetana 1978: Figs 23, 24, 22 respectively). *abdominale* (Fabricius)
 Prosternum with large, complex, laterally foveate apical projection (Fig. 4); basal segment of metatarsus scarcely longer than segment 2 (Fig. 6); aedeagus with parameres narrowed apically (Fig. 7) *marginale* (Sharp)

***Dactylosternum abdominale* (Fabricius)**

D. abdominale, often cited by the synonymous name *D. insulare* (Laporte), is the most widespread and common species of the genus. It occurs in nearly all areas with tropical climates, including most tropical islands of the Pacific, New Caledonia and New Guinea, and this species also extends into warm temperate areas of Europe, Japan and the United States (Balfour-Browne 1945; d'Orchymont 1925, 1928; Smetana 1978). This extraordinarily broad distribution has been attributed in large part to repeated human-influenced introductions in historical times (d'Orchymont 1925, Smetana 1978), but the original distribution of the species remains doubtful and published documentation of its spread is scanty. The species occurs commonly in all kinds of decaying organic matter, including compost heaps, cow and chicken manure and other synanthropic habitats. Such habits suggest how individuals might have spread with human commerce. *D. abdominale* is described in detail and extensively illustrated by Smetana (1978).

D. abdominale was first recorded from Australia by d'Orchymont (1925), who gave no specific locality, but later (d'Orchymont 1928, 1937) he mentioned "Queensland". Apparently there are no other published records from Australia (Todd 1961). I have seen numerous collections of *D. abdominale* from Australia, the earliest dated collection being from 1929 (see below). These collections clearly indicate that the species is well established and very widespread in Australia (Fig. 1). With the exception of one collection from "poultry manure", there are no data on exact circumstances of capture. *D. abdominale* has not been recovered during extensive collections made in recent years in natural habitats adjacent to the cities and towns in which it has been found. It is likely from this limited information

that the species has become established in Australia since the early part of this century and is synanthropic, but further information is needed on its habitat in Australia.

D'Orchymont (1925, 1928, 1937) drew special attention to the fact that *D. abdominale* was absent from New Zealand. It was subsequently reported from near Auckland in 1960 (Todd 1961), but collections from this area had been made as early as 1940 (see below). *D. abdominale* is now relatively common in the greater Auckland area, and has also been found near Te Awamutu, Rotorua, Whangarei and Nelson (Fig. 1). All of the 21 New Zealand collections bearing detailed data were made in synanthropic microhabitats in residential areas. The species has not been found under natural conditions in New Zealand. Thus *D. abdominale* is evidently a recent introduction to New Zealand and is strictly synanthropic there.

Material examined

AUSTRALIA: AUSTRALIAN CAPITAL TERRITORY: 1, Monash, 11.i.1987, W. Dressler (ANIC); 1, Weston, 28.vi.1973, T. Bellas (ANIC). QUEENSLAND: 1, no further data (MV); 2, Brisbane (MV, SAM); 4, Brisbane, Illidge (ANIC); 2, Brisbane, vii.1933, J. G. Brooks (ANIC); 4, Cairns, vi.1946, N. L. H. Krauss (USNM); 3, Cairns district, A. M. Lea (SAM); 1, Mackay (MV); 1, Townsville, G. F. Hill (SAM). VICTORIA: 1, Black Rock, v.1929, J. C. Goudie (MV); 3, Burnley, ii.1981, poultry manure (ANIC); 1, East Warburton, 17.ii.1976, A. Neboiss (MV); 1, Marysville, F. E. Wilson (MV). SOUTH AUSTRALIA: 1, Adelaide (SAM). WESTERN AUSTRALIA: 1, Swan River, J. Clark (MV).

NEW ZEALAND [all in NZAC except as noted; two-letter regional codes after Crosby et al. 1976]: AK: 1, Epsom, 30.x.1947, K. A. J. Wise; 1, Henderson, 3.iii.1956, K. A. J. Wise, in poultry droppings tray; 17, Karaka, 9.ii.1960, D. H. Todd, in ensilage; 3, Kumeu, 21.vi.1975, J. C. Watt, in fowl manure; 45, Lynfield, Mt. Roskill, G. Kuschel (11, 2.iii.1975, from soil around dead sheep under *Acacia mearnsii* grove; 1, 14.iii.1975, in week old lawn clippings with fermenting peaches; 4, 23.iii.1975, on fermenting fruit; 2, 31.iii.1975, from straw, dung, feed of chicken coop; 2, 21.vi.1975, in straw, manure, feed from floor of hen house; 1, 20.xii.1975, in garden compost; 8, 24.iv.1976, in compost bin; 5, 5.vi.1976, in compost bin; 1, 12.vi.1976, in compost bin; 5, 19.vi.1976, in compost bin; 2, 17.vii.1976, in compost bin; 1, 4.iii.1978; 2, 14.xii.1980, in chicken yard); 1, Mangere, 18.ii.1951, K. P. Lamb; 2, Mt. Albert, 17.x.1959, B. M. May, in compost; 1, Owairaka, 4.ix.1940, D. Spiller, under sacking; 1, Owairaka, 27.iii.1958, K. A. J. Wise, under sacking on ground; 1, Remuera, 7.xii.1948, S. A. Rumsey; 1, Titirangi, 11.iii.1979, P. A. Maddison, in flight; 1, Titirangi, 23.iv.1975, N. A. Martin. BP: 4, Rotorua, 22.iv.1984, R. Hume, in enchytraeid worm culture. ND: 2, Glenbervie Forest, near Whangarei, 14.iv.1960, C. W. O'Brien (BPBM). NN: 1, Nelson City, 23.ii.1966, J. C. Watt, on window of building.

Dactylosternum dytiscoides (Fabricius)

This very distinctive, bi-coloured species is widespread in the Indo-Malayan region from Sri Lanka to New Guinea, New Britain, Aru and Woodlark Island (Knisch 1924, d'Orchymont 1926, 1928). It was first reported from Australia by Blackburn (1898) who described one

or more specimens as a new species, *Cyclonotum cowleyi*, from Cairns, northern Queensland. The synonymy of *C. cowleyi* with *D. dytiscoides* was established by d'Orchymont (1926), based on a specimen of *C. cowleyi* from Cairns named by A. M. Lea. *D. dytiscoides* was described, partially illustrated and differentiated in a key from other Oriental species by d'Orchymont (1913).

In addition to the specimens from Cairns mentioned by Blackburn (1898) and d'Orchymont (1926), I am aware of one other collection of *D. dytiscoides* from Australia (see below, and Fig. 1). Because this species is continuously and presumably naturally distributed through the island of New Guinea and other areas immediately to the north of Australia, it seems likely that its occurrence in northern Queensland is also natural, but further records are needed to confirm that the species is established in Australia and what its habits and habitat are. A series of specimens from New Guinea were collected from the "rotting tip of a felled betel nut palm" (8, Irian Jaya, "Hollandia" [now Jayapura], 250 ft., rainforest, 4.VI.1945, H. Hoogstraal (FMNH)).

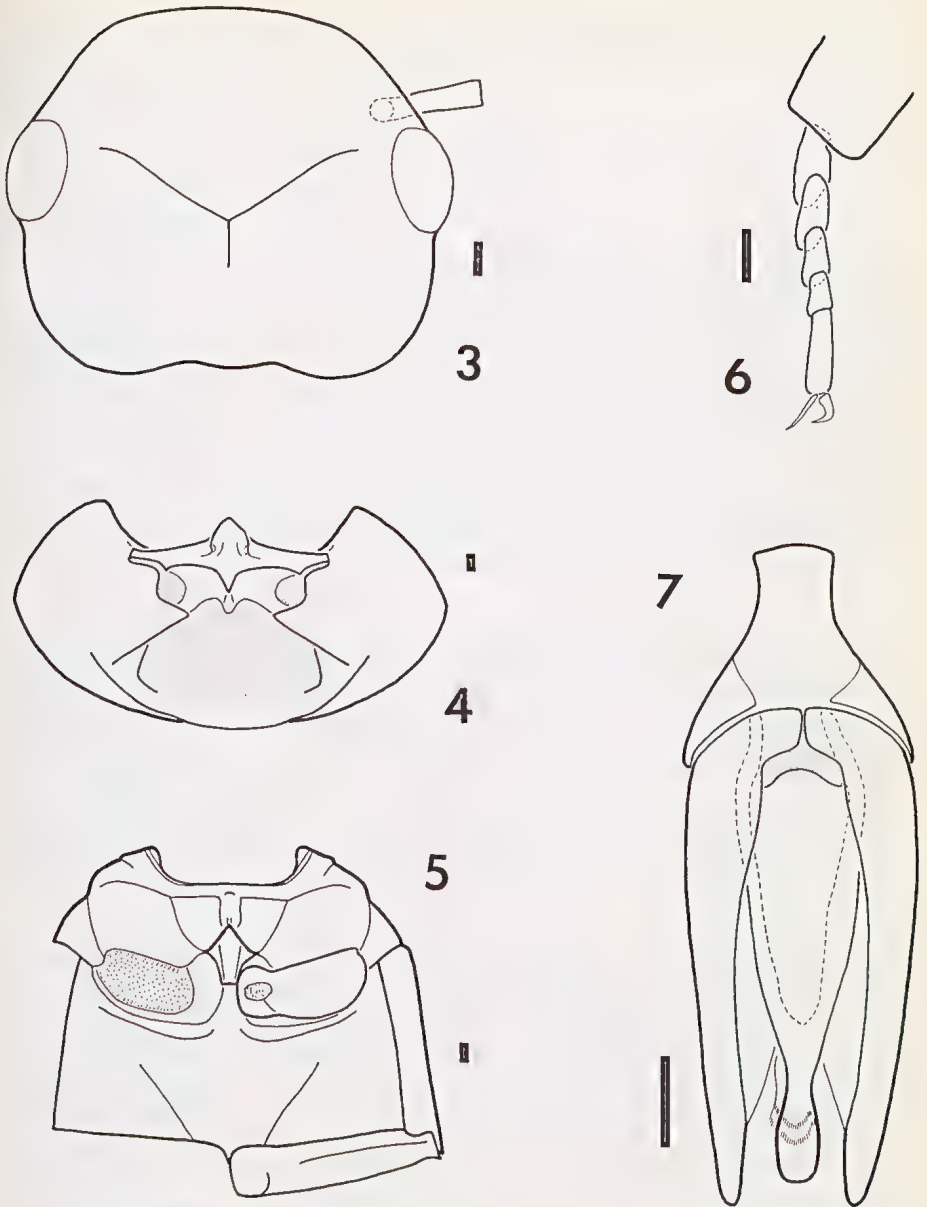
Material examined

AUSTRALIA: QUEENSLAND: 3, Normanton (MCZ).

Dactylosternum marginale (Sharp)

This species was originally described from Auckland, New Zealand, as *Cyclonotum marginale* (Sharp 1876). Not long after, Sharp (1884) commented on some distinctive structures of this species (relatively short basal segment of hind tarsus, convex orbicular form) which he thought might require the separation of this and a few similar species from *Cyclonotum* and *Dactylosternum*. He concluded with the comment that "*C. marginale* is an Australian insect, and has apparently been found in New Zealand only about Auckland", but gave no Australian records or references. This comment seems to have been overlooked or dismissed by subsequent authors with the exception of Hudson (1934), who placed an asterisk (indicating an introduced species) before this name in his checklist of New Zealand Coleoptera. The species was transferred to *Dactylosternum* by d'Orchymont (1919), who felt that the characters used by Sharp (1884) to suggest generic distinctness were of little value. Knisch (1924) and d'Orchymont (1925) list only New Zealand for the distribution of *D. marginale*, and d'Orchymont (1937) lists it as endemic to North Island, New Zealand. The species has apparently not yet been formally recorded from Australia or elsewhere outside of Auckland.

D. marginale is actually widespread in eastern Australia, from southern New South Wales to northern Queensland (see below, and Fig. 2). Australian collections with detailed data are from native moist tropical, subtropical and warm temperate forests, and specimens



Figs 3-7. Structures of *Dactylosternum marginale* (male, Minnamurra Falls): (3) head capsule, dorsal view, basal segment of right antenna shown; (4) prothorax, ventral view, coxae removed; (5) meso- and metathorax, ventral view, right coxae and metapleuron removed; (6) right metatarsus, dorsal view, setae not shown; (7) aedeagus, dorsal. Scale bars equal 0.1 mm.

have been found mainly in association with decaying logs. Although I have not seen collections dated earlier than 1904 from Australia, Sharp's (1884) statement and the available habitat information strongly suggest that the occurrence of this species in Australia is natural, and I conclude that the species is indigenous to Australia.

A very recent collection of *D. marginale* has been made on Norfolk Island (see below), but details of capture are not recorded. It is not clear if this represents a recent introduction from Australia or a natural occurrence of the species.

G. Kuschel's recently collected specimen (see below) and the original type of the species are the only New Zealand collections known to me. Both collections were made in the Auckland metropolitan area, and at least the later one in a synanthropic habitat. The species has not been found under natural conditions during more than a century of intensive collecting throughout New Zealand. Evidently the Auckland records represent an early introduction (or perhaps more than one introduction) of *D. marginale* to New Zealand from Australia, possibly via Norfolk Island.

D. marginale is unique among about two dozen examined species of *Dactylosternum* in the structure of the mid-prosternal apex (Fig. 4), but in all other respects appears to fit the concept of the genus provided by Smetana (1978) and Malcolm (1981). Some diagnostic structures of this species are shown in Figs. 3-7. Most specimens of *D. marginale* in the South Australian Museum were identified as *D. abdominale* by A. M. Lea, and may have been distributed by Lea under that name, but one specimen from Swan River was correctly named by Lea as *D. abdominale*.

Material examined

AUSTRALIA: NEW SOUTH WALES: 4, Dorrigo (SAM); 4, Dorrigo, Griffith Colln. (SAM); 1, Dorrigo N. P., 700 m, 11.vii.1978, S. & J. Peck, rotten logs & fungi (ANIC); 1, Dorrigo N. P., east end Blackbutt Track, 710 m, 28.ii-5.iii.1980, A. Newton & M. Thayer, window trap 589 (USNM); 31, Minnamurra Falls, 10 km west of Kiama, 200 m, 11.vi.1978, S. & J. Peck, frass under bark (ANIC); 1, Sydney (SAM); 2, Sydney, Brooklana, 1925, W. W. Froggatt, hoop pine (ANIC); 1, Wiangaree S. F., Brindlee Creek, 28°23'S, 153°03'E, 740 m, 29.ii-3.iii.1980, A. Newton & M. Thayer, window trap 592 (USNM). QUEENSLAND: 3, no further data (SAM); 3, Bunya Mtns., 3 km from summit on Kingaroy Rd., 26°50'S, 151°33'E, 6.i.1970, Britton, Holloway, Misko, light trap in Nothofagus forest (ANIC); 4, Lake Barrine, 17°15'S, 145°38'E, 14.ix.1965, R. S. Angus (ANIC); 1, Lake Barrine, 750 m, 29.vii.1982, S. & J. Peck, bark & fungus litter (ANIC); 2, Lamington N. P., Binna Burra, 900 m, 23.vi.1978, S. & J. Peck, rotten bark litter (ANIC); 1, Lamington N. P., O'Reillys, 28°14'S, 153°08'E, 22-27.x.1978, Lawrence & Weir, under bark rotten logs (ANIC); 3, Millaa Millaa, Atherton Tab., 2500 ft., iv.1932, Darlington (MCZ); 6, Mt. Lewis Road, 7 M. above Bushy Creek, 25.v.1969, Brooks & Neboiss, under bark of wet log (ANIC); 2, Mt. Tambourine, A. M. Lea (SAM); 1, Witches Falls N. P., Tamborine Mt., 27°56'S, 153°11'E, 21.x.1978,

Lawrence & Weir, under bark (ANIC). State uncertain: 1, Windsor, Hood, vii.1904 (MV).

NEW ZEALAND: 1, AK, Lynfield, Tropicana Drive, 24.iv.1976, G. Kuschel, compost bin (NZAC).

NORFOLK ISLAND: 1, Norfolk Island N. P., Mt. Bates, 300 m, 21.iii.1984, E. D. Edwards (ANIC).

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BOOK NOTICE

Insect Delight — A Life's Journey. J.W. Evans. 1989. 224 pp, illustrated by Faith Evans. Price \$16.50 plus \$3.50 postage and packaging. Available from Brolga Press, P.O. Box 335, Curtin, A.C.T., 2605.

This enchanting autobiography weaves the threads of the author's delight in insects with many other threads in a busy and fulfilling life.

John Evans was born in India and brought up in England. After completing his education he migrated to Australia and joined the CSIR, later to become the CSIRO, soon after the former was founded in the 1920's. Subsequently he held a succession of scientific and senior administrative posts in Australia and in England, where he returned during World War II.

In 1954 he was appointed Director of The Australian Museum in Sydney, of which he is now Director Emeritus. He retired at the age of 60 to devote himself fully to research, particularly on leafhoppers, on which he is an international authority.

The book is illustrated by his wife, Faith, a daughter of the well known entomologist, Dr R.J. Tillyard FRS, and a scientist in her own right.